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Quasi adaptive automatic control system synthesis with a reference model for multiple connected object with state delays

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Abstract

© Research India Publications. The implementation of complex object control laws, including multiple connected ones has various difficulties caused by numerous factors: the presence of non-linearities in the communication channels of an object, incomplete information about object parameters, the impossibility of a control object state vector measurig, etc. An important factor complicating the implementation of control laws, is the presence of non-linearities in the control channels of an object. These nonlinearities are presented by delays. The delays, which are concentrated in the communication channels of a control object, may lead to self-oscillation, the deterioration in the quality of management processes and even to the loss of a system stability. The proposed synthesis method is based on the method of matrix canonization and system introduction technologies. A set of solutions concerning the synthesis problem of a quasi adaptive automatic control systems with a reference model for multi connected object with state delays was received in this paper. The conditions of these solution existence were determined during the synthesis concerning the forced component of mismatch for a closed dynamic system that allow us to find the set of observer and regulator matrices satisfying control law. The novelty of the proposed method is to form the set of equivalent control laws in an analytical form and to obtain the conditions of a set of synthesis problem solution existence before the formation of a problem solution. The results of digital simulation confirm the delay compensation according to the state and the achievement of the desired processes in a control system. The proposed method of synthesis may be used to manage complex technical objects with delays (such as mobile objects).

Keywords

Object with the delays by state, Quasi adaptive system, Reference model, System introduction technology